RESVERATROL IN WINE AND THE FRENCH PARADOX :

MYTH OR REALITY?

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INTRODUCTION & OBJECTIVES

The term French paradox arose from an epidemiological observation, where it was possible to observe a relatively low incidence of cardiovascular disease in the French population, even when it had a sufficiently high dietary intake of saturated fat . For this reason, resveratrol and its vasculoprotective properties were thought to be linked to the possible health benefits attributed to moderate wine consumption.

The objectives of this review are to investigate whether it makes sense to state that the levels of resveratrol found in wine may actually play a cardioprotective role. We will identify what its effective dose is through literature review, and whether it is found in wine in these concentrations. We will also try to study which stimuli can intervene on the accumulation of resveratrol in grapes and to what extent the amount of this compound can be increased using biotechnological practices. Lastly, conclude whether the wine would be organoleptically suitable under these certain conditions.

CARDIOPROTECTIVE RESERVERATROL DOSE

Through human subject research it has been observed that different doses of resveratrol by vasodilation have cardioprotective effects. Wong et *al*. (2011) is the study that identified the smallest effective dose, which is 30 mg/day.

STIMULI THAT INTERVENE ON THE ACCUMULATION OF RESVERATROL IN GRAPES

The terminal enzyme involved in the biosynthesis of resveratrol is stilbene synthase, which isactivated by exogenous stressors, ultraviolet light and chemical signals defined from pathogenic fungi. In addition, several factors during the winemaking processsupport the increase of transresveratrol levels such as increased temperature, higher SO2 levels and/or decreased pH.

RESVERATROL CONCENTRATION IN RED WINES

Wine Variety	Total
PIN	9.39
MER	9.19
CAS	3.23
TEM	3.43
GAR	6.37
AVG	5.65

Note. Cabernet Sauvignon, CAS; Merlot, MER; Pinot noir PIN; Tempranillo, TEM; i Garnatxa, GAR. Values are expressed as mg/L of wine. The data refers to the set formed by resveratrol and piceid.

INDUCTION OF RESVERATROL BY UV-C IRRADIATION

Variety	Control	UV
TEM	4.76	22.45
CAS	1.97	19.28
MER	15.43	35.51
SYR	4.28	14.30
MON	11.18	11.64
GAR	2.37	12.05
CAR	2.37	26.21

Note. Tempranillo, TEM; Cabernet Sauvignon, CAS; Merlot, MER; Syrah, SYR; Monastrell, MON; Garnatxa, GAR and Carinyena, CAR .Values are expressed as mg/1Kg fresh weight of total grape berry. This datat refers to the set formed by resveratrol, piceid, piceatannol and viniferins.

BIOAVAILABILITY OF RESVERATROL

Although other studies suggest that resveratrol has high intestinal absorption (Walle et al., 2004), its bioavailability is very low. Research that used 25 mg oral doses showed peak concentrations of <10 ng/ml at 0.5–2 h in plasma after ingestion and most of the oral dose was recovered in the urine.

ORGANOLEPTIC PROPERTIES OF A WINE WITH A HIGH RESVERATROL CONTENT

Gaudette and Pickering (2011) evaluated the sensory properties of a Cabernet Sauvignon fortified with 20 and 200 mg/L resveratrol. Even though the high concentration of resveratrol did not alter the taste or aromatic profile of Cabernet Sauvignon, a change in the colour of the wine was detected.

CONCLUSIONS

When observing the concentrations in which the wine is found, we can see that it is not possible to absorb the effective dose through moderate consumption, so the interpretations drawn on the French paradox which identified wine as a cardioprotective element would be wrong.

There are several stimuli involved in the accumulation of resveratrol. UV-C irradiation has been shown to increase resveratrol synthesis in grapes, but unfortunately the maximum levels achieved are still far from the minimum dose with cardioprotective effect. Considering as shown the minimum dose 30 mg/day and a moderate wine consumption (200mL/day), we can conclude that a wine with cardioprotective effect should contain a minimum concentration of 150 mg/L of resveratrol.

If a wine with a dose of cardioprotective effect was to be created, it would be interesting to evaluate its organoleptic properties and get the legislation to consider it as a functional wine to avoid possible rejection by the consumer.

It would be very appropriate forfurtherstudies to research on how to increase the bioavailability of resveratrol in humans, as it is primarily responsible for this polyphenol having such a high therapeutic dose. Achieving greater bioavailability could greatly help the biotechnological techniques used in wine to achieve their goals.

Gaudette, N. J. i Pickering, G. J. (2011) «Sensory and chemical characteristics of trans-resveratrol-fortified wine», Australian Journal of Grape and Wine Research, 17(2), p. 249-257.

Wong, R. H. X., Howe, P. R.C., Buckley, J. D., Coates, A. M., Kunz, I. i Berry, N. M. (2011) «Acute resveratrol supplementation improves flow-mediated dilatation in overweight/obese individuals with mildly elevated blood pressure», Nutrition, Metabolism and Cardiovascular Diseases, 21(11), p. 851-856.